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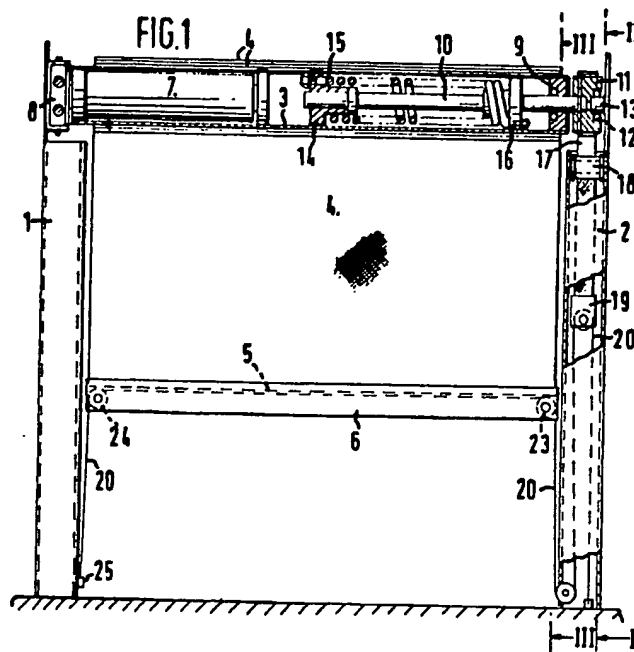
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(58) Field of search

E1J

(54) Roller apparatus

(57) Roller apparatus, for a window blind or other flexible member, comprises a roller tube (3), a reversible electric motor (7) or other driving means in one end of the roller tube, a coaxial torsion spring (15) anchored in the other end of the roller tube and carrying a tape reel (11) for connection by a tape (17) to a pulley system connected by a cord (20) and draw bar (6) to the blind (4). The spring is pre-loaded and maintains the whole system in tension.



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SPECIFICATION

Roller apparatus

5 This invention relates to roller apparatus for winding a flexible member on to or from a roller, such as is used in roller blinds, rolling doors, and greenhouse shuttering among other applications.

10 Many constructions of such roller apparatus are known but most suffer from the disadvantage that the flexible member is not under tension throughout its travel. This is disadvantageous for smooth operation, in outside applications, where the flexible member can be caught by the wind, and in darkroom roller blinds where the edges of the blind have to travel in side channels.

The present invention provides roller apparatus which enables the flexible member to be maintained in tension as it is wound smoothly on to or from the roller and comprises a basic mechanism which is adaptable to a variety of uses.

25 According to the invention, roller apparatus, for winding a flexible member on to or from a roller, comprises a roller tube, rotary driving means at one end of the roller tube, a torsion spring anchored coaxially in the other end of the roller tube and a tape reel coaxial with and connected to be driven through the torsion spring.

In use, the spring is pre-loaded so that it can flex in torsion in either direction and maintain tension in the roller system.

35 In a preferred construction, the driving means is a reversible electric motor housed on the roller tube. Other power or manual driving means could be used, for example a flexible shaft drive to gear means in the roller tube.

40 In a preferred arrangement, the tape reel is connected by a tape to a pulley system for connection to a draw bar across the free end of a flexible sheet member to be wound on to or from the roller. This improves control of a flexible sheet member.

45 Other features of the invention are set forth in the appended claims and a preferred embodiment of the invention will now be described, by way of example, with reference to the accompanying drawing, in which:-

50 *Figure 1* shows somewhat diagrammatically in front elevation and partly in section, window blind apparatus in accordance with the invention,

55 *Figure 2* is a vertical section on the line II-II of *Fig. 1*, and

Figure 3 is a vertical section on the line III-III of *Fig. 1*.

60 The apparatus illustrated is mounted in side frame channel members 1 and 2 at the sides of a window.

A roller tube 3 has wound thereon flexible blind sheet material 4 of which the free end 65 5, or draw-off end, is secured in a draw bar

6.

Housed in the left-hand end of the roller tube 3, as seen in *Fig. 1*, is a reversible electric motor 7 with connections to control gear (not shown) such as is well known for window blind and like apparatus. A motor head 8 on the frame 1 provides a mounting for the motor and a bearing for rotation of the roller tube 3 which is keyed to the drive hub of the motor 7.

75 At the right-hand end, the roller tube 3 has a bearing 9 on a shaft 10 to the outer end of which is keyed coaxially a tape reel 11 carried by a bearing 12 on a stub journal 13 mounted on the frame 2.

80 At its inner end, within the roller tube 3, the shaft 10 is journaled in a hub 14 which is keyed to the roller tube 3, so as to rotate therewith, and also anchors one end of a helical torsion spring 15 extending coaxially along the shaft 10.

85 At its other end, towards the right-hand end of the roller tube 3, the spring 15 is anchored to a collar 16 fast on the shaft 10 and rotatable therewith relatively to the roller tube 3.

90 It can be seen that, when the motor 7 turns the roller tube 3, the hub 14 turns with the roller tube and applies torque to the torsion spring 15 through which the shaft 10 is turned to rotate the tape reel 11.

95 In use, the torsion spring 15 is pre-loaded to maintain tension in a tape 17 anchored to and wound on the tape reel 11 and led over a guide pulley 18 to a pulley block 19 vertically movable in the frame 2.

100 The pulley block 19 is the operative member of a blind control pulley system comprising a pulley cord 20 anchored by one end 21 in the bottom of the frame 2 and passing upwardly through the pulley block 19 and downwardly therefrom to a return pulley 22 in the bottom of the frame 2.

105 From the return pulley 22, the cord 20 passes out of the frame 2 and upwardly to enter the draw bar 6 and extend, over draw pulleys 23 and 24, through the draw bar, across the free end of the blind 4, from which the cord finally passes down to an anchorage 25 at the bottom of the frame 1.

110 Through the pre-loading of the torque spring 15, the whole system of tape reel 11, tape 17, pulley cord 20, blind 4 and roller tube 3 is maintained in tension under a load determined by the characteristics and pre-loading of the spring 15.

120 To lower the blind 4, the motor 7 is operated to turn the roller tube 3 and, through the spring 15, the tape reel 11 clockwise, as seen in *Fig. 2*, to raise the pulley block 19 and draw on the cord 20 to pull down the blind which unwinds from the roller tube 3 turning clockwise, as seen in *Fig. 3*.

125 Reverse operation raises the blind 4 by winding it on to the roller tube, the corresponding rotation of the tape reel 11 permit-

ting the tape 17 and pulley system to follow the blind movement but under tension maintained by the spring 15.

It will be apparent that the basic mechanism, consisting of the roller tube, driving motor, or other driving means, spring and tape reel, could be made of appropriate size and power to operate other flexible members, for example a rolling door of slat construction, and that the tape and pulley system could be replaced by equivalent components, such as cable and cable drum sprocket members.

Being maintained under tension, the system can be inherently counter-balanced so that it is not dependent on gravity and can be used in any attitude; vertical, horizontal or inclined.

CLAIMS

1. Roller apparatus, for winding a flexible member on to or from a roller, comprising a roller tube, rotary driving means at one end of the roller tube, a torsion spring anchored coaxially in the other end of the roller tube and a tape reel coaxial with and connected to be driven through the torsion spring.

2. Roller apparatus according to claim 1, in which the rotary driving means is a reversible electric motor housed in the roller tube.

3. Roller apparatus according to claim 1 or 2, in which the torsion spring is a helical torsion spring anchored by one end to the roller tube and by its other end to a coaxial shaft which is rotatable relatively to the roller tube and carries the tape reel.

4. Roller apparatus according to claim 1, 2 or 3, in combination with a pulley system connected to the tape reel for control of a flexible member to be wound on to or from the roller tube.

5. Roller apparatus according to claim 4, in which a draw bar is provided for connection between the pulley system and the free end of a flexible sheet member wound on the roller tube.

6. Roller apparatus substantially as described with reference to and as shown by the accompanying drawing.